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FBI Laboratory

2501 Investigation Parkway
Quantico, Virginia 22135

REPORT OF EXAMINATION

To: Boston
Kristin Koch

Date: June 5, 2013

Case ID No.: 415M-BS-2814367

Lab No.: 130416021 AAR FY
130418012 AAR FY
130422100 AAR FY
130429100 AAR FY
130503001 AAR FY
130507007 AAR FY

Reference: Communications dated April 19, 2013, April 23, 2013, April 29, 2013, May 2, 2013, and May 6, 2013

Your No.:

Title: UNSUBS;
4/15/2013 Boston Marathon Bombing
IT

Dates specimens received: April 16, 2013, April 17, 2013, April 18, 2013, April 22, 2013, April 29, 2013, May 3, 2013, and May 7, 2013

The specimens listed below were examined in the Nuclear DNA Unit under cover of communication dated April 19, 2013 (130416021 AAR FY):**THE FOLLOWING ITEMS WERE RECEIVED AT THE LAB ON APRIL 16, 2013:****BOYLSTON STREET, SCENE 1 (SCENE A)**

Q10 Round metal object (Your S10, E5180221)

BOYLSTON STREET, SCENE 2 (SCENE B)

Q11 Black backpack from street (Your S2001, E5180255)

**THE FOLLOWING ITEMS WERE RECEIVED AT THE LAB ON APRIL 17, 2013
(SUBMISSION 1):**

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BOYLSTON STREET, SCENE 1 (SCENE A)

Q39 Wires and circuit board (Your S42, E5180270)

Q39.1 - Tape from Q39 (Your S42, E5180270)

Q39.2

BOYLSTON STREET, SCENE 2 (SCENE B)

Q42.6.4 MTDNAU DNA extract from Q42.6.4 (Hair from Q42.6) (Your S2027, E5180260)

Q42.6.6 MTDNAU DNA extract from Q42.6.6 (Hair from Q42.6) (Your S2027, E5180260)

Q44 Device component (Your S2031, E5180262)

Q52 Electrical components (Your S2099, E5180258)

Q52.1 - Tape from Q52 (Your S2099, E5180258)

Q52.5

**THE FOLLOWING ITEMS WERE RECEIVED AT THE LAB ON APRIL 17, 2013
(SUBMISSION 2):**

BOYLSTON STREET, SCENE 1 (SCENE A)

Q68.1 Portion of miscellaneous debris (Your S25, E5180285)

Q82 Black metal zipper pull (Your S39, E5180389)

Q109.1 Three (3) zipper pulls (Your S91, E5180290)

Q109.1.1 One (1) zipper pull from Q109.1 (Your S91, E5180290)

**THE FOLLOWING ITEMS WERE RECEIVED AT THE LAB ON APRIL 18, 2013
(SUBMISSION 1):**

BOYLSTON STREET, SCENE 2 (SCENE B)

Q113 Nokia cell phone (Your S2153, 1B111, E5180398)

Q119 Piece of grey fabric (Your S2119, E5180344)

Q119.1 Piece of white caulk (Your S2119, E5180344)

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- Q119.2 Grey string material (Your S2119, E5180344)
- Q119.3 Piece of black fabric (Your S2119, E5180344)
- Q141 Piece of backpack (Your S2129, E5180438)
- Q143 Black fabric (Your S2055, E5180411)
- Q150 Fabric with handle (Your S2023, E5180329)
- Q161 Zipper pull tab (Your S2112, E5180346)

BOYLSTON STREET, SCENE 1 (SCENE A)

- Q188 One (1) wire and two (2) pieces of plastic (Your S136, E5180458)
- Q210 Battery and metal fragment (Your S124, E5180420)

The specimens listed below were examined in the Nuclear DNA Unit under cover of communication dated April 23, 2013 (130418012 AAR FY):

SCENE 2 (SCENE B)

- K3 Buccal swab from [REDACTED]

- K4 Buccal swab from [REDACTED]

MEDICAL EXAMINER'S OFFICE

- K14 One tube of blood from TAMERLAN TSARNAEV (Your ME31, E5179042)

The specimens listed below were examined in the Nuclear DNA Unit under cover of communication dated April 23, 2013 (130422100 AAR FY):

Acquired from [REDACTED]

- Q750 [REDACTED]

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The specimens listed below were examined in the Nuclear DNA Unit under cover of communication dated May 6, 2013 (130429100 AAR FY):

Acquired from [REDACTED]

K43 Buccal swabs of [REDACTED]

Acquired from [REDACTED]

K46 Buccal swabs from [REDACTED]

The specimens listed below were examined in the Nuclear DNA Unit under cover of communication dated May 2, 2013 (130503001 AAR FY):

K56 Two (2) buccal swabs from [REDACTED]

K57 Two (2) buccal swabs from [REDACTED]

The specimens listed below were examined in the Nuclear DNA Unit under cover of communication dated May 6, 2013 (130507007 AAR FY):

K62 Two (2) buccal swabs from [REDACTED]

K63 Two (2) buccal swabs from [REDACTED]

This report contains the results of the serological and nuclear DNA analyses.

Results of Serological Examinations:

Blood was identified¹ on specimen Q119. A chemical test for the possible presence of blood was positive² on specimens Q52, Q52.1 through Q52.5, and Q119.1 through Q119.3; however, the presence of blood was not confirmed. Specimen Q150 was examined for the presence of blood; however, none was detected.³

Results of Nuclear DNA Examinations:

It is noted that based on information contained in the incoming communication dated April 23, 2013, specimens K3 and K4 were provided as elimination samples and hereafter will be referred to as K3 (Elimination) and K4 (Elimination). These specimens were used for elimination purposes for comparison to all the questioned specimens analyzed.

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Specimens Q10-1, Q11-1, Q11-2, Q39-1, Q42.6.4, Q42.6.6, Q44-1, Q52-1, Q52-2, Q52.1-1, Q68.1-1, Q82-1, Q109.1-1, Q109.1.1-1, Q113-1, Q119-1, Q141-1, Q143-1, Q150-1, Q161-1, Q188-1, Q210-1, Q750-1, K3 (Elimination), K4 (Elimination), K14 (T. TSARNAEV), K43 (), K46 (), K56 (), K57 (), K62 (), and K63 () were subjected to deoxyribonucleic acid (DNA) typing by the polymerase chain reaction (PCR). The AmpFSTR® Identifier® Plus PCR Amplification Kit was used for this analysis.⁴ In addition, specimens Q11-1, Q11-2, Q52-1, Q52-2, Q52.1-1, Q109.1-1, Q109.1.1-1, Q113-1, Q119-1, Q141-1, Q143-1, Q161-1, Q210-1, Q750-1, K3 (Elimination), K14 (T. TSARNAEV), K22 (), K43 (), K56 (), K62 (), and K63 () were subjected to DNA typing by the PCR using the AmpFSTR® Yfiler™ PCR Amplification Kit.⁵ A more detailed description of the samples collected from the various questioned specimens is provided in the table below:

Q10-1	Swabbing of hexagonal bolt head and hexagonal nuts on round metal object
Q11-1	Swabbing of knotted strap section from Q11 backpack fragments
Q11-2	Swabbing of strap with Velcro area from Q11 backpack fragments
Q39-1	Swabbing of wires from Q39 and swabbing of portions of tape in contact with wires from Q39.1, and Q39.2
Q42.6.4	MTDNAU DNA extract from the Q42.6.4 hair
Q42.6.6	MTDNAU DNA extract from the Q42.6.6 hair
Q44-1	Swabbing of bolt head and nut
Q52-1	Swabbing of stained area of the electrical components
Q52-2	Swabbing of charred debris on wires of the electrical components
Q52.1-1	Swabbing of stained area on tape from the electrical components
Q68.1-1	Swabbing of surface of rubber-type fragment
Q82-1	Swabbing of metal-type zipper pull
Q109.1-1	Swabbing of three metal-type zipper pulls
Q109.1.1-1	Swabbing of leather-type zipper pull
Q113-1	Swabbing of buttons, screen, top, bottom, and side edges of cell phone
Q119-1	Swabbing of top surface of fabric fragment
Q141-1	Swabbing of entire surface of Q141 backpack fragment
Q143-1	Swabbing of entire surface of Q143 fabric fragment
Q150-1	Swabbing of handle and tabs of Q150 fabric fragment with handle
Q161-1	Swabbing of metal, fabric, and plastic zipper pull
Q188-1	Swabbing of entire wire and plastic fragment of the Q188 specimen
Q210-1	Swabbing of top and bottom of battery of the Q210 specimen
Q750-1	Swabbing of the inside of the wrist, palm, and finger regions of both gloves

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Based on the typing results from the amelogenin locus, female DNA is present in the DNA obtained from specimens Q44-1, K4 (Elimination), K46 ([REDACTED]), and K57 ([REDACTED]). Male DNA⁶ is present in the DNA obtained from specimens Q11-1, Q39-1, Q52.1-1, Q113-1, Q119-1, Q141-1, Q150-1, Q750-1, K3 (Elimination), K14 (T. TSARNAEV), K22 ([REDACTED]), K43 ([REDACTED]), K56 ([REDACTED]), K62 ([REDACTED]), and K63 ([REDACTED]). The amelogenin typing results from specimens Q11-2, Q52-1, Q52-2, Q82-1, Q109.1-1, Q143-1, Q161-1, Q188-1, Q210-1 indicate a mixture of male and female DNA. No amelogenin typing results were obtained from specimen Q68.1.

The STR and Y-STR typing results from all the above-listed items were compared to the STR and Y-STR typing results from specimen K16 (D. TSARNAEV), a known buccal sample from DZHOKHAR TSARNAEV [submitted under FBI Laboratory Number 130420100 AAR FY and reported in the FBI Laboratory report dated May 21, 2013], specimen K22 ([REDACTED]), a known buccal sample from [REDACTED] [submitted under FBI Laboratory Number 130422100 AAR FY and reported in the FBI Laboratory report dated June 3, 2013], and specimen K70 ([REDACTED]), a known buccal sample from [REDACTED] [submitted under FBI Laboratory Number 130508016 AAR FY and reported in the FBI Laboratory report dated May 19, 2013].

No amelogenin (for sex determination) or STR typing results⁷ were obtained from specimens Q10-1, Q42.6.4, Q42.6.6, or Q109.1.1-1.

The STR typing results from specimen Q11-1 indicate the presence of DNA from two or more individuals. A major contributor can be discerned and is suitable for comparison purposes. The STR typing results for the minor contributor to specimen Q11-1 are suitable for matching purposes. Based on the autosomal STR or the Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of DNA obtained from specimen Q11-1.

The STR typing results obtained from specimen Q11-2 indicate the presence of DNA from three or more individuals. Based on the autosomal STR or Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of DNA obtained from specimen Q11-2. It is noted that the Y-STR typing results obtained from specimen Q11-2 indicate the presence of DNA from two or more males.

The STR typing results obtained from specimen Q39-1 indicate the presence of DNA from two or more individuals. These results are not suitable for matching purposes; however, they may be utilized for exclusionary purposes.⁹ Based upon the STR typing results, all the

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reference samples listed in this report are excluded as potential contributors to the mixture of DNA obtained from specimen Q39-1.

The STR typing results from specimen Q44-1 are consistent with having arisen from a single female individual and are suitable for comparison purposes. Based upon the STR typing results, all the reference samples listed in this report are excluded as potential contributors to the DNA obtained from specimen Q44-1.

The STR typing results obtained from specimens Q52-1 and Q52-2 indicate the presence of DNA from three or more individuals. Based on the autosomal STR or the Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of DNA obtained from specimens Q52-1 and Q52-2. It is noted that the Y-STR typing results obtained from specimens Q52-1 and Q52-2 indicate the presence of DNA from three or more males.

The STR typing results obtained from specimen Q52.1-1 indicate the presence of DNA from two or more individuals. A major contributor can be discerned and is suitable for comparison purposes. The STR typing results for the minor contributor to specimen Q52.1-1 are not suitable for matching purposes; however, they may be utilized for exclusionary purposes.⁹ Based on the autosomal STR or the Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of DNA obtained from specimen Q52.1-1.

The STR typing results obtained from specimen Q68.1-1 are not suitable for matching purposes; however, they may be utilized for exclusionary purposes.⁹ Based upon the STR typing results, specimens K3 (Elimination), K4 (Elimination), K57 (), K62 (), K63 (), and K70 () are excluded as potential contributors of the DNA obtained from specimen Q68.1-1. No comparison information for specimen Q68.1-1 can be provided for specimens K14 (T. TSARNAEV), K16 (D. TSARNAEV), K22 (), K43 (), K46 (), and K47 ().

The STR typing results obtained from specimen Q82-1 indicate the presence of DNA from two or more individuals. Based on the STR typing results, all the reference samples listed in this report are excluded as potential contributors to the mixture of the DNA obtained from specimen Q82-1.

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The STR typing results obtained from specimen Q109.1-1 indicate the presence of DNA from three or more individuals. Based on the autosomal STR or Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of DNA obtained from specimen Q109.1-1. It is noted that the Y-STR typing results obtained from specimen Q109.1-1 indicate the presence of DNA from four or more males.

The STR typing results from specimen Q113-1 indicate the presence of DNA from three or more individuals. A major contributor can be discerned and is suitable for comparison purposes. The STR typing results for the minor contributors to specimen Q113-1 are suitable for matching purposes. Based on the autosomal STR or Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of the DNA obtained from specimen Q113-1. It is noted that the Y-STR typing results obtained from specimen Q113-1 indicate the presence of DNA from two or more males.

The STR typing results obtained from specimens Q119-1, Q143-1, Q150-1, and Q161-1 indicate the presence of DNA from three or more individuals. Based on the autosomal STR or Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of the DNA obtained from specimens Q119-1, Q143-1, Q150-1, and Q161-1. It is noted that the Y-STR typing results obtained from specimen Q119-1 and Q161-1 indicate the presence of three or more males, and the Y-STR typing results from specimen Q143-1 indicate the presence of four or more males. Specimen Q150-1 was not subjected to amplification for the Y-STR genetic loci.

The STR typing results obtained from specimen Q141-1 indicate the presence of DNA from two or more individuals. A major contributor can be discerned and is suitable for comparison purposes. Based on the autosomal STR or Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of the DNA obtained from specimen Q141-1. It is noted that the Y-STR typing results obtained from specimen Q141-1 indicate the presence of DNA from two or more males.

The STR typing results obtained from specimen Q188-1 indicate the presence of DNA from three or more individuals. These results are not suitable for matching purposes; however, they may be utilized for exclusionary purposes.⁹ Based upon the STR typing results, specimens K3 (Elimination), K4 (Elimination), K14 (T. TSARNAEV), K16 (D. TSARNAEV), K22 (██████████), K43 (██████████), K56 (██████████), K57 (██████████), K62 (██████████), K63 (██████████), and (██████████) are excluded as potential contributors to the mixture of the DNA obtained from specimen Q188-1. No comparison

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information for specimen Q188-1 can be provided for specimen K46 ([REDACTED])

The STR typing results obtained from specimen Q210-1 indicate the presence of DNA from four or more individuals. Based on the autosomal STR or Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of the DNA obtained from specimen Q210-1. It is noted that the Y-STR typing results obtained from specimen Q210-1 indicate the presence of DNA from three or more males.

The STR typing results from specimen Q750-1 indicate the presence of DNA from three or more individuals. A major contributor can be discerned and is suitable for comparison purposes. The STR typing results for the minor contributors to specimen Q750-1 are suitable for comparison purposes. Based on the autosomal STR or Y-STR typing results, all the reference samples listed in this report are excluded⁸ as potential contributors to the mixture of DNA obtained from specimen Q750-1. It is noted that the Y-STR typing results obtained from specimen Q750-1 indicate the presence of DNA from three or more males.

The DNA typing results for specimen Q44-1, and the major contributors discerned in specimens Q11-1, Q113-1, and Q141-1 will be entered into the Combined DNA Index System (CODIS). These results will be maintained by the FBI Laboratory for possible future comparisons.

No other serological or nuclear DNA examinations were conducted.

Methods/Limitations:

The following methods and limitations apply to the results/conclusions provided in the results section(s) of this report and are referenced by number in the body of the text for clarity.

¹ The identification of blood on an item is established by first using, when applicable, the presumptive phenolphthalin test followed by the confirmatory Takayama Hemochromogen test.

² A positive reaction with the phenolphthalin reagent, without subsequent confirmation using the Takayama Hemochromogen test, provides an indication that blood may be present on an item, but it does not constitute an identification of blood. Insufficient quality and/or quantity of biological material may affect the ability to confirm the presence of blood.

³ This conclusion is based on the result of the phenolphthalin test. Insufficient quality and/or quantity of biological material may affect the ability to detect blood.

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⁴ The AmpFSTR® Identifiler® Plus PCR Amplification Kit includes the amelogenin locus and the autosomal STR loci (from non-sex chromosomes) D8S1179, D21S11, D7S820, CSF1PO, D3S1358, TH01, D13S317, D16S539, D2S1338, D19S433, vWA, TPOX, D18S51, D5S818, and FGA. The amelogenin locus is used for sex determination. Insufficient DNA quality and/or quantity can affect the ability to generate a DNA typing result and is not an absolute determination that an individual did not come into contact with an item of evidence.

⁵ The AmpFSTR® Yfiler™ PCR Amplification Kit includes the STR loci DYS456, DYS389I, DYS390, DYS389II, DYS458, DYS19, DYS385a/b, DYS393, DYS391, DYS439, DYS635, DYS392, Y_GATA_II4, DYS437, DYS438 and DYS448. These STR loci are located on the male Y-chromosome and are transmitted through a paternal lineage from father to son. Barring mutation (a rare event which may occur in a sperm cell prior to transmission of the Y-chromosome to a biological son), all males in the same paternal lineage have the same Y-STR typing results.

⁶ The presence of male DNA in a mixture may limit the ability to determine if female DNA is also present in that mixture.

⁷ Insufficient DNA quality and/or quantity can affect the ability to generate DNA typing results.

⁸ It is noted that barring mutation, any male relative within the same paternal lineage has the same Y-STR profile and would therefore also be expected to be excluded. A paternal lineage consists of those male relatives to whom the same Y-chromosome has been transmitted from a common ancestor.

⁹ As used here, STR typing results are deemed not suitable for matching purposes (i.e., inconclusive) when the potential exists that not all of the genetic information in a biological sample has been detected. For STR typing results to be used for matching purposes, sufficient DNA quality and/or quantity is necessary.

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Remarks:

The supporting records for the opinions and interpretations expressed in this report are retained in the FBI files. The submitted items will be returned to you under separate cover. For questions about the content of this report, please contact Forensic Examiner Alan M. Giusti at [REDACTED]. For questions about the status of your submission, including any remaining forensic examinations, please contact Supervisory Special Agent Edward S. Knapp, Jr. at [REDACTED].

In addition to the evidence in the case, the Nuclear DNA Unit has generated secondary evidence that will also be returned to you. The secondary evidence can be found in a package marked NUCLEAR DNA UNIT SECONDARY EVIDENCE. It is recommended that this evidence be stored in a refrigerator or freezer and isolated from evidence that has not been examined.

Alan M. Giusti
Nuclear DNA Unit

This report contains the opinions/interpretations of the examiner(s) who issued the report.

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